COMMUNITY FOREST MANAGEMENT PLAN

FOR THE COMMUNITY OF

Crystal Lake
Beaufort County
PO Drawer 1228
Beaufort, SC 29901

Contact Name: Beaufort County Planning Department
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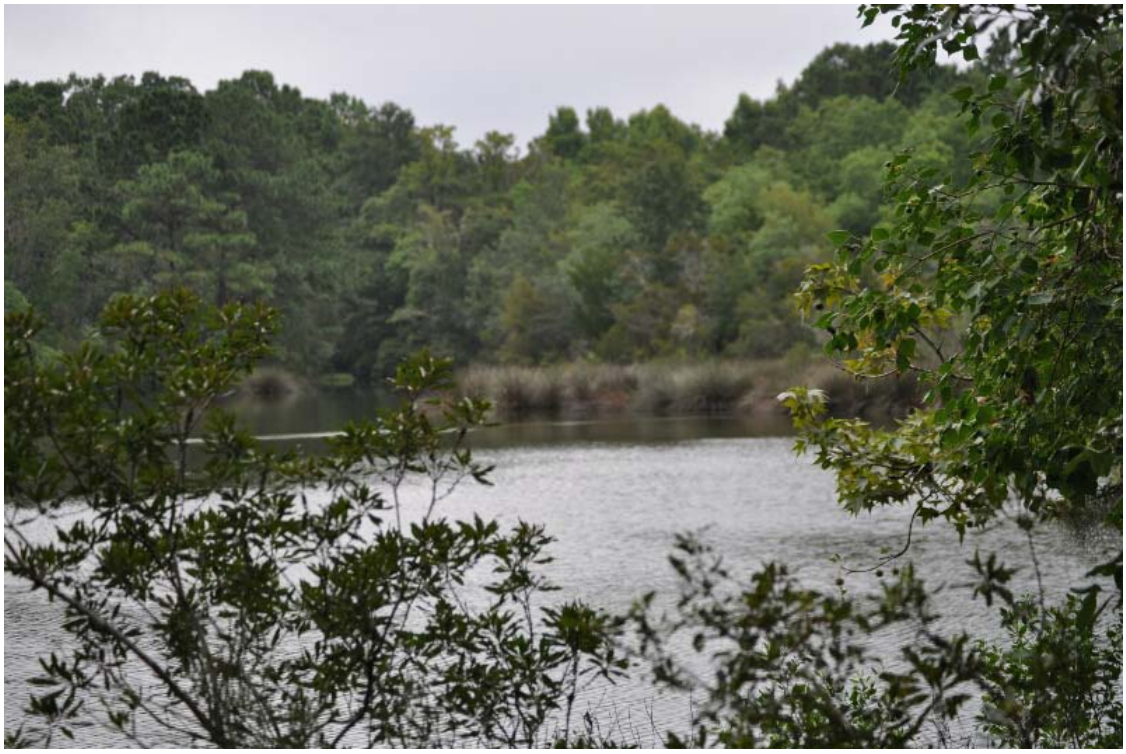

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Billy McCord, *Wildlife Biologist 3 (retired)*, SC Department of Natural Resources
Photography by Dawn Ramsey

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LOCATION

This tract is known as Crystal Lake and is located in Beaufort County approximately 0.5 mile south of the intersection of US 21 and SC HWY 802. Crystal Lake is bordered by St. Peter's Catholic Church to the north, SC HWY 802 and Rue du Bois Road to the south and east, and Beaufort High School sports fields to the west. Access can be obtained from Rue De Bois Road and from the Beaufort High School Football Stadium parking lot. A permit for a boardwalk connecting the Rue De Bois Road entrance to the existing lake has been submitted to OCRM for approval.

ACREAGE

The Crystal Lake property consists of a 6.8 acre lake, 4 acres of wetlands, and 15 acres of uplands totaling about 25 acres. The lake was created many years ago when the area was used as a borrow pit. The natural hydrology of the wetlands has been disrupted by road construction and nearby development over the years. The wetlands drain into Port Royal Sound and contain both fresh and salt water. Vegetation includes forested wetlands, maritime, mixed upland, and pine forest.

GOALS

The main goal for Crystal Lake is to prepare the area to be a passive park with a boardwalk and trail around the lake. The objectives for the property are:

1. Recreation
    - Future plans call for boardwalks to be constructed for vistas and easy walking around the wetter parts of the property for educational opportunities and public health to meet the goal of recreation for the County. This specific pathway location will be chosen at a later date. This plan will focus on taking steps to manage the community forest to work towards meeting the goal of recreation.

2. Control of the invasive tallow tree
    - Currently some stands have the Chinese Tallow tree, which is an extremely invasive species as defined by the Southeastern Regional Taxonomic Center and the South Carolina Department of Natural Resources. The second objective is to achieve some control over the tallow to help the present native species of trees and shrubs continue to thrive for recreation, educational, and wildlife purposes.

3. Water quality maintenance
    - Evaluation of the current water system on the property reveals that the system is complex and has been altered by anthropogenic means. It contains both fresh water and salt water wetlands that may be tidally

influenced.

4. Preservation and enhancement of wildlife habitat for birds, mammals, reptiles and amphibians.
    - The fourth goal is to enhance places for birds to nest and roost. While visiting the tract, red tail hawks, cooper's hawks, great blue herons, egrets, and cormorants were observed. In addition to birds, the tract is home to a variety of reptiles and amphibians that is enhanced by the presence of both fresh and saline water. Mammals present include deer, raccoons, opossums, and squirrels. (See Appendix A, Crystal Lake Master Naturalist List of Plants and Animals, for a full list) Recommendations from Bruce Lampright, Wildlife Biologist for Brays Island, are as follows:
        - Run all trails away from steep bank that drops into lake
        - Use Master Naturalists & other volunteers to remove trash
        - Consider building kayak dock & platform for wildlife viewing & classroom activities – use southwest corner of lake
        - Determine watershed & drainage pattern for lake and measure salinity
        - Many large mullet sighted jumping during visit. The varieties of fish present in lake can be assessed using a seine net in the future.
        - Possible outdoor classroom site at northwest corner of pond near massive live oaks
        - Great potential for class use from both Beaufort High & St. Peters. Possibly work with high school to determine if students would be interested in participating in some cleanup and improvement projects

Currently, there is a parking area and 3,150 square foot building located at the corner of SC HWY 802 and Rue du Bois Road. The building is in good condition and will be utilized as an education and interpretive center.

CONTACT FOR MANAGEMENT RESPONSIBILITES

Currently, Crystal Lakes is classified as a rural and critical property that is managed by Beaufort County Facilities Maintenance and the Planning Department. Once the property has been improved and ready for public use, the property will be managed by Beaufort County in cooperation with the Friends of Crystal Lake who are currently in the process of obtaining a 501C3 status.

Acreage by Habitat Type – Crystal Lake, Beaufort Co.

Habitat Type	Area	Acreage
Pond Area	1	4.7
Pine Hardwood mix	2	4.0
Pine	3	1.5
Needle Rush	4	0.5
Wetlands	5	4.0
Pine & Sweetgum	6	9.6
Total		**24.3**

HISTORICAL, CULTURAL, ARCHEOLOGICAL SITES

No significant historical or archaeological sites were seen during onsite visits. Significant historical or archeological sites add a tremendous aesthetic value to the property and should be protected against development and during silvicultural operations. Further information on old gravesites, homesites and their preservation can be obtained from your local library or the SC State Historic Preservation Office at 8301 Park Lane Road, Columbia, SC 29223 (803-896-6175).

THREATENED & ENDANGERED SPECIES

No threatened or endangered species (T&E) were noted during the initial land reconnaissance. If T & E Species are found to be located on the property, they will be considered a unique aspect of the property and will be protected for future generations to enjoy. Species that may occur in Beaufort County include: Venus' fly-trap, Southern hognose snake and the red-cockaded woodpecker.

Questions, identification, or management guidelines for any threatened or endangered species that may occur can be directed to:

US Fish and Wildlife Service

Ecological Services
176 Croghan Spur Road

Suite 200
Charleston, SC 29407

843-727-4707

SC Department of Natural Resources

1000 Assembly Street
Columbia, SC 29202

803-734-3886

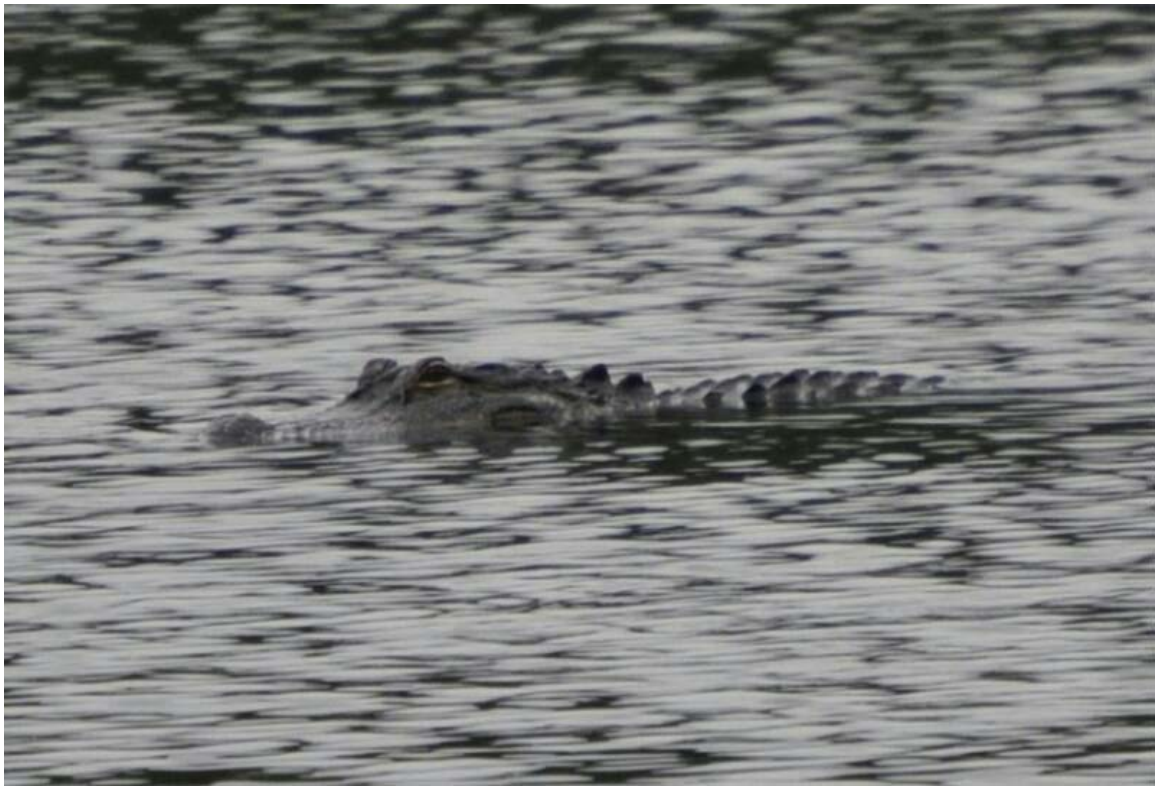
SOILS AND WATER QUALITY

There are three major soil types on the tract. Polawana loamy fine sand comprises the majority of the tract (about 67%), followed by Seabrook fine sand (~26%), and Ridgeland fine sand (~7%). The 6.8 acre lake was dug in the area that contained the Seabrook fine sand. The building and parking lot was placed in the area that has the Ridgeland fine sand. The remainder of the tract is Polawana loamy fine sand. Soil type maps along with general soil type descriptions are located in the Detail Soils Information section of this plan. Soil types present are also included in the Stand Descriptions portion on a stand-by-stand basis.

All forest management operations should be conducted in compliance with SC's Best Management Practices (BMPs). A brochure outlining these guidelines is provided in the Best Management Practices section of this plan. More detailed information is available upon request from any office of the SC Forestry Commission.

STAND DESCRIPTIONS AND RECOMMENDATIONS

Area 1 – Pond – 4.7 Acres



Stocking: Nonstocked

Present Condition: The pond is possibly brackish, because salt and fresh water both empty into the pond. The pond supports various species of aquatic life (fish, alligators, turtles, etc.)

Recommendations: The salinity of the pond should be determined. Also, current varieties of fish may be assessed by using a seine net.

Area 2 – Pine Hardwood mix – ± 4.0 Acres

Age: Uneven aged stand
Size Range: Saplings & 8 - 28 inches DBH
Height: 75+ feet total height of dominant trees
Stocking: Variable

Overstory Vegetation: Loblolly pine, Sweetgum, Live Oak. *The northern end of the property is heavier in Live oaks.*

Understory Vegetation: The shrub component includes wax myrtle, Eastern red cedar and yaupon holly. The density of the understory is variable. There are portions of this area where the understory is moderately thick with hardwood sprouts, vines and briars while other areas are fairly open. Hardwood sprouts and saplings noted include water oak and sweetgum.

Soils: This area contains Seabrook fine sand and Polowana loamy fine sand.

Present Condition: The stand is in good health, and there is no evidence of significant insect and/or disease damage. Invasive tallow tree was noted to comprise an estimated 1-3% of the stand.

Recommendations: Use an approved herbicide according to label directions. A licensed pesticide applicator can supply specific recommendations. Please see appendix for further details on tallow control.

Area 3 – Pine Stand (Peninsula) - ± 1.5 Acres

Age: Uneven aged stand
Size Range: 8 - 24 inches DBH
Height: 70+ feet total height of dominant trees
Stocking: Variable

Overstory Vegetation: Lobolly pine trees, few magnolia, sweet gums

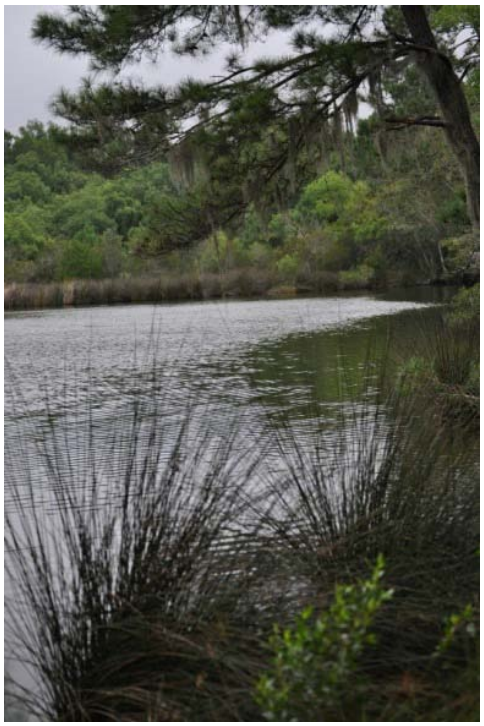
Understory Vegetation: The shrub component includes wax myrtle, cherry, and yaupon holly. The density of the understory is variable. There are portions of this area where the understory is moderately thick with hardwood sprouts, vines and briars while other areas are fairly open.

Soils: This area contains Polowana loamy fine sand.

Present Condition: There is no evidence of significant insect and/or disease damage. No invasive species were noted.

Recommendations: This area is currently used as a roosting site for several species of birds and in the future access may be restricted to protect this area.

Area 4 – Needle rush - ± 0.5 Acres



Vegetation: Needle rush is growing on 3 sides of the lake.

Soils: This area contains Polowana loamy fine sand.

Present Condition: Needle rush is an indicator of brackish water and tidal influence.

Recommendations: None.

Area 5 – Wetlands - ± 4.0 Acres

Age: Uneven aged stand
Size Range: Saplings & 8 - 12 inches DBH
Height: 70+ feet total height of dominant trees
Stocking: Variable

Overstory Vegetation: Loblolly pine, Sweetgum, Chinese Tallow Tree

Understory Vegetation: The shrub component includes wax myrtle, Eastern red cedar and yaupon holly. The density of the understory is variable. There are portions of this area where the understory is moderately thick with hardwood sprouts, vines and briars while other areas are fairly open. Hardwood sprouts and saplings noted include water oak, black cherry, and sweetgum. Assorted native herbaceous vegetation includes….?

Soils: This area contains Polowana loamy fine sand.

Present Condition: There is no evidence of significant insect and/or disease damage. Invasive tallow tree was noted to comprise an estimated 95% of the stand.

Recommendations: It is suggested that the mature Chinese Tallow Trees (3" DBH and larger) be on a three year rotation for the Hack and Squirt Method with a 50/50 mix of Clearcast and water. There should be at least 3 hacks around the circumference of the trunk (the lower the better) to be able to get through the bark into the cambium. The 50/50 Clearcast mix should be squirted into the wound. The opportune time to perform this method is in the fall between October and December. (See Appendix B, Chinese Tallow Tree Herbicide Specifications, for further recommendations).

Area 6 – Pine, Sweet Gum, Chinese Tallow trees - ± 9.6 Acres

Age: Uneven aged stand
Size Range: Saplings & 8 - 30 inches DBH
Height: 75+ feet total height of dominant trees
Stocking: Variable

Overstory Vegetation: Loblolly pine, Sweetgum, Chinese Tallow Tree

Understory Vegetation: The shrub component includes wax myrtle, Eastern red cedar and yaupon holly. The density of the understory is variable. There are portions of this area where the understory is moderately thick with hardwood sprouts, vines and briars while other areas are fairly open.

Soils: This area contains Polowana loamy fine sand.

Present Condition: There is no evidence of significant insect and/or disease damage. Invasive tallow tree was noted to comprise an estimated 95% of the stand.

Recommendations: It is suggested that the mature Chinese Tallow Trees (3" DBH and larger) be on a three year rotation for the Hack and Squirt Method with a 50/50 mix of Clearcast and water. There should be at least 3 hacks around the circumference of the trunk (the lower the better) to be able to get through the bark into the cambium. The 50/50 Clearcast mix should be squirted into the wound. The opportune time to perform this method is in the fall between October and December. (See Appendix B, Chinese Tallow Tree Herbicide Specifications, for further recommendations)

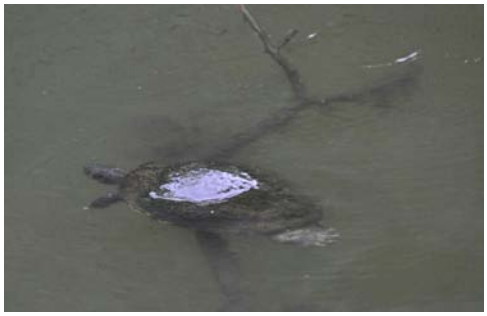
10 Year Management Recommendations – Crystal Lake
Beaufort County, South Carolina

Stand	Year	Season	Management Practice		Date Completed
All	2013-2023	---	Identify / Maintain property boundaries		
1	2013	---	Install bird boxes around lake		
2	2013		Control invasive tallow with herbicide application		
3		---	Install bird boxes, in future restrict access to peninsula		
4			None		
5			Control invasive tallow with herbicide application		
6	2013		Control invasive tallow with herbicide application		
7	2013		Control invasive tallow with herbicide application		

Appendix A

Crystal Lake List of Plants and Animals

Birds
Anhinga
Cooper's Hawk
Blue jay
Little blue heron (immature)
Brown headed nut hatch
Mississippi kite (pair soaring above the property)
Brown thrasher
Pileated woodpecker
Cardinal
Red belly woodpecker
Carolina wren
Ruby-throated hummingbird
Crow
Vulture
Double crested cormorant
White-eyed vireo
Great White Heron (feathers courtship plumage)
Wood stork
Green Heron
Yellow crowned night heron (possible colony)
Other Animal Species
Alligator
Mullet
Ant lions
Shrimp
Dragonfly
Yellow-bellied sliders
Fawn killed and being recycled by the vulture
Yellow rat snake/king skeleton
Gulf fritillary
Golden silk spider
Four-spotted Pennent



Plant Species	
Common Name	***Genus Species***
Aster	
Bahia grass	
Beautyberry	*Callicarpa americana*
Bed straw	
Bermuda grass	
Black cherry	*Prunus serrotina*
Blackberry	*Rubus*
Blueberry	*Vaccinium*
Bluestem	
Broomsedge	*Andropogon sp*
Carolina jessamine	*Gelsemium sempervirens*
Cattail	*Typhus sp*
Centipede	*Erilochia*
Chinquapin	*Castanea*
Croton	
Dog fennel	
Dwarf palmetto	*Sabel minor*
Fox grape	*Vitis*
Frog fruit	*Lyppia sp*
Frost aster	
Glasswort	*Salicornia virginica*
Goldenrod	*Solidago sp*
Japanese honeysuckle	*Lonicera japonicum*
Laurel oak	*Quercus hemispherica*
Lettuce	
Life everlasting	*Gnaphalium obtusifolium*
Live oak	*Quercus virginiana*
Loblolly pine	*Pinus taeda*
Lots of other grasses	
Magnolia	*Magnolia grandiflora*
Marsh grass	*Spartina alterniflora*

Mulberry	*Morus rubra*
Needlerush	*Juncus roemariensis*
Palmetto tree	*Sabal palmetto*
Pampass grass	
Pea vine	
Peppervine	
Pignut hickory	*Carya*
Plantain	*Plantago sp*
Poison ivy	*Rhus toxicodendron*
Popcorn tree, Chinese tallow tree	*Sapium sebiferum*
Ragweed	*Ambrosia*
Red bay	*Persea borbonia*
Red cedar	*Juniperus silicola*
Rose	*Rosa*
Salt myrtle	*Baccharis halmifolia*
Sassafras	*Sassafras albibum*
Scuppernong	*Vitis*
Sea lavender	
Sedge	*Scirpus cyperinus*
Sensitive plant	*Mimosa stringulosum*
Sicklepod	
Smartweed	*Persicaria pennsylvaticum*
Smilax, cat brier	*Smilax sp*
St. John's wort	*Hypericum*
Sweet gum	*Liquidambar styraciflua*
Tupelo	*Nyssa sylvatica*
Verbena	*Verbena bonariensis*
Viginia creeper	*Parthenocissus*
Water oak	*Quercus nigra*
Wax myrtle	
Winged sumac	*Rhus coppalina*
Witchgrass	*Dicanthelium sp*
Yaupon holly	*Ilex vomitoria*

APPENDIX B

CHINESE TALLOW TREE[1]

Why don't we want the pretty tree to grow in our area?

Non-native species that out competes native species and disturbs the balance of the eco-system.

Why is it so successful and aggressive?

1. **Tolerant of many soil types**

    - It grows rapidly in mesic and hydric soils throughout the South Carolina Coastal Zone. Although it prefers mesic and hydric soils, it is extremely adaptable and occasionally occurs in xeric soils as well. It grows rapidly in moist, low salinity soils, but can tolerate short, occasional periods of saltwater flooding.

    - Chinese tallow tree is an aggressive colonizer of damp habitats and out-competes many native species, such as button bush (*Cephalanthus occidentalis*) and swamp gum (*Nyssa biflora*), that are valuable native wildlife plants.

2. **Vigorous reproducer**

    - Reaches sexual maturity in as little as three years and may remain productive for 100 years. Fruit with three seeds each, mature in the fall and are often consumed by birds. A mature tree can produce more than 100,000 seeds annually. Seeds are dispersed through bird droppings or by water. Seeds may remain viable for as long as a century.

3. **Outgrows native plants and tolerant of varying light conditions**

    - Seedlings and saplings of Chinese tallow tree grow rapidly in full sunlight, and moderate, sustained growth typically occurs under low light conditions, with the growth rate of young Chinese tallow tree frequently higher than that of many native, shade-tolerant species.

[1] The source of information contained in this fact sheet is: 'Restoration of Isolated Wetlands and Surrounding Uplands on North Williman and Old Combahee Islands, Beaufort County, South Carolina', Cooperative Agreement Number 401818G553 between United States Department of the Interior, Fish and Wildlife Service and South Carolina Department of Natural Resources, John W. McCord, Project Leader

- Many wetland plants, particularly herbs and shrubs, including button bush, require substantial sunlight, canopy closure by Chinese tallow tree causes a dramatic reduction in native plant diversity, and aggressive colonization of Chinese tallow tree can ultimately produce monotypic thickets.

- Fallen leaves from Chinese tallow tree produce soil chemicals that promote germination of Chinese tallow tree seeds, thereby sponsoring Chinese tallow tree dominance. Additionally, chemicals from the fallen leaves may suppress germination of seeds of native species and/or restrict growth of some native plants.

- Chinese tallow tree has a competitive advantage over most native plants because of limited grazing from both vertebrates and invertebrates. Also, Chinese tallow tree is relatively free of negative impacts from pathogens. In contrast, most native plants have co-evolved with native herbivores. Foliage, buds and young stems are consumed by various insects and typically also by herbivorous and omnivorous mammals.

- Chinese tallow tree also displays rapid compensatory re-growth following forced, intense defoliation, and even under a variety of resource levels in competitive conditions. This amazing resilience further explains the competitive advantage that this highly invasive species has over native plants.

- Chinese tallow tree has a competitive advantage over many native plants in susceptibility to growing-season fire damage since plants produce abundant shade and its leave decompose rapidly compared to those of most native plants, thereby preventing build-up of fuel beneath stands of Chinese tallow tree.

4. Alteration of native habitat/hydrological systems

- Invasive trees and shrubs, such as punktree (*Melaleuca quinquenervia*) and Chinese tallow tree, which colonize wetlands, can cause increased evapo-transpiration due to high water demands during the growing season and can negatively impact water-table levels, thereby influencing hydrological systems. Dense stands of large Chinese tallow tree undoubtedly have a high water demand during the growing season, causing dewatering of depression wetlands that would otherwise be more open and retain more moisture and surface water for longer duration.

- Potential dewatering of wetlands caused by dense colonization of Chinese tallow tree may diminish the duration of surface water availability, possibly ultimately completely dewatering some wetlands, thereby significantly reducing biodiversity of amphibians, aquatic insects and other water-dependent wildlife and plants.

- Dewatering of wetlands also allows Chinese tallow tree to gradually invade toward the center or lower, typically wetter, portion of wetlands. Concurrently, Chinese tallow tree population increases adjacent to and within wetlands are sponsored by the chemicals from fallen Chinese tallow tree leaves which promote germination and growth of Chinese tallow tree seeds/seedlings of native plants. Ultimately, seasonally flooded wetlands and shallow ponds may evolve into forested wetlands with closed canopies dominated by Chinese tallow tree.

Treatment Recommendations

Treat Chinese tallow trees (stem diameter ≥ 1 inch) with herbicides via "hack and squirt" (tree stems are hacked by cane-knife or machete and the herbicide is squirted into the open wound via squirt bottle). Recommended herbicides include 50% Habitat and 50% Clearcast. This should achieve a kill rate of ~95%.

The death of the trees ≥1 inch will significantly reduce canopy closure, thereby dramatically increasing sunlight penetration to the forest floor. An explosive germination of Chinese tallow tree seeds is anticipated in association with wetlands the spring following the chemical treatment and death of the trees. An important exercise will be to hand-pull the seedlings to prevent further Chinese tallow tree growth. Concurrently, there should be a rapid response of native plants to increased sunlight.

In areas where the Chinese tallow tree sprouts are too dense for hand pulling, the sprouts should be eradicated by foliar herbicide spraying with back-pack sprayers. Spray will be mixture of 1-2% Clearcast (herbicide)and 1-2% Summit MSO (a nonionic adjuvant and surfactant that enhances uptake of foliar herbicides). Foliar spraying will also be used to kill sprouts from trunks and roots of Chinese tallow trees that did die completely from hack and squirt treatments.

The treated areas will need to be monitored as the Chinese tallow trees die and fall over to determine if some should be piled out of waterways.